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FIG 2

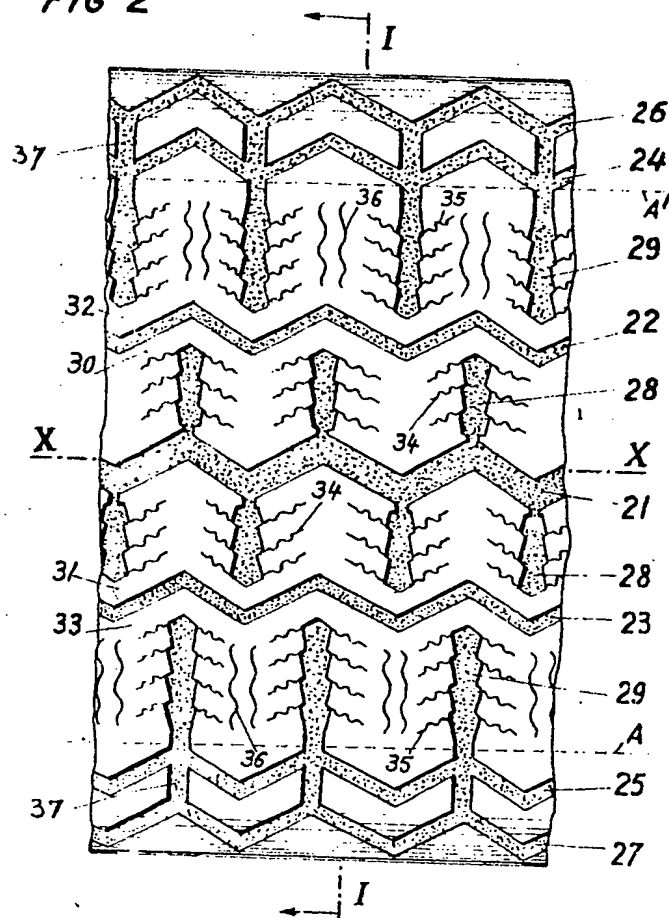
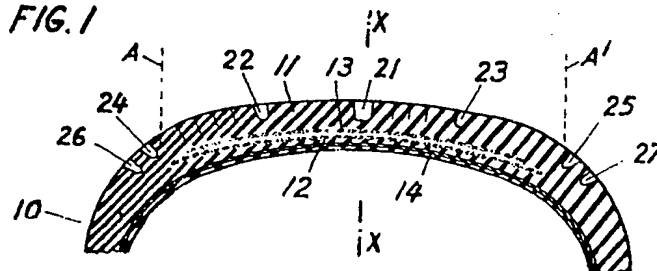


FIG. 1



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## COMPLETE SPECIFICATION

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# PATENT SPECIFICATION

(11) 1212795

1212795

## DRAWINGS ATTACHED

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## (54) IMPROVEMENTS IN AND RELATING TO PNEUMATIC TYRES

(71) We, MICHELIN & CIE (COMPAGNIE GENERALE DES ETABLISSEMENTS MICHELIN) a French Body corporate of 4 rue du Terrail, Clermont-Ferrand, Puy-de-Dome, France, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—  
 10 This invention relates to pneumatic tyres of the so-called radial type, i.e. having a carcass reinforced with cords all of which lie in planes containing the axis of the tyre and having a crown reinforcement bracing the tread.

Such tyres have very good road holding qualities but the circumferential stiffness imparted to the tread by the crown reinforcement can lead to passenger discomfort, the reason being that the bracing of the tread can prevent the tread from conforming to the shape of the surface on which the tyre rolls. Also, excessive stiffness of the tread can, in certain circumstances, give rise to excessively severe lateral reactions.

The invention is concerned with reducing these disadvantages without sacrificing the advantages of such tyres or introducing such disadvantages as increased wear.

This is done in accordance with the invention by providing the tread with a central circumferential groove, two circumferential "side" grooves are on each side of the central groove disposed substantially equidistantly between the central groove and the edges of the tread and transverse grooves extending from opposite sides of the central groove towards but not as far as one of the side grooves.

In this manner the ribs bounded by the grooves are given freedom to yield somewhat both circumferentially and transversely and the tread is made somewhat less stiff without being weakened.

Preferably, the transverse grooves on one side of the central groove are staggered relatively to those on the other side.

Also, in the preferred form of the inven-

[Price 5s. 0d. (25p)]

tion, the tyre has in the vicinity of the edges of the tread circumferential "edge" grooves having transverse grooves which extend from them towards but not as far as the side grooves. 50

It is advantageous for the circumferential grooves to zigzag round the tyre and for the transverse grooves to proceed from the crests of the zigzags. 55

An example of a tyre in accordance with the invention is shown in the accompanying drawings in which:—

Figure 1 is a cross-section through the tyre taken on the line I—I in Figure 2 which is a plan of Figure 1 drawn on a larger scale. 60

Figure 1 shows a tyre 10 having a tread 11 braced by a crown reinforcement composed of two plies of steel cables 12 and 13 disposed radially outwards from a carcass composed of a ply 14 of cables disposed in radial planes. The tyre illustrated here is relatively wide and has rounded shoulders. 65

The equatorial plane of the tyre is marked X—X and the planes defining the edges of the tread are marked A and A' respectively. The surfaces covered with dots in Figure 2 represent grooves; the plain surfaces represent ribs. 70

In the region of the equatorial plane there is a central circumferential groove 21 having on opposite sides of it two "side" grooves 22 and 23 of smaller width than the groove 21 and disposed substantially equidistantly between the central groove and the appropriate plane A or A'. In the region of each edge of the tread there is a further circumferential "edge" groove 24 or 25 of about the same width as the side grooves 22, 23. 75

The ribs 30 and 31 bounded by the central groove 21 and the side grooves 22, 23 and the ribs 32 and 33 bounded by the latter grooves and the edge grooves 24, 25 are circumferentially endless. 80

All the grooves and therefore the ribs which they bound zigzag round the tread, their undulations being all in phase with each other. 85

Branching from opposite sides of the cen-

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tral groove 21 at its crests are transverse grooves 28 which proceed in opposite directions towards but not as far as the side grooves 22, 23. The transverse width of the ribs 30, 31 is thus locally restricted and their circumferential rigidity is thus somewhat reduced. In other words the ribs have some freedom to yield circumferentially. Being bounded by grooves they also have some freedom to yield transversely which is enhanced by the transverse grooves 28.

Similarly, there are grooves 29 branching from the edge grooves 24, 25 towards but not as far as the side grooves 22, 23 having a similar effect on the ribs 32, 33.

The width of the ribs 30—33 where this is restricted by the transverse grooves measured at right angles to the side grooves 22—23 should not exceed 10% of the width of the tread; nor should it be less than 3%. A width of about 5% of the width of the tread is generally very satisfactory.

It will be seen that the circumferential and transverse dimensions of the blocks bounded by the circumferential and transverse grooves are not very different from each other. In other words, the spacing between neighbouring circumferential grooves is about the same as that between neighbouring transverse grooves. It is found that approximate equality of these spacings gives a very good compromise between tread flexibility, resistance to wear and good cornering behaviour.

As will be seen the edge grooves 24, 25 are actually just outside the tread, i.e. in the shoulders between the tread proper and the sidewalls. They therefore have the effect of giving the tread and the sidewalls some degree of independence of movement. This is enhanced by the further pair of endless circumferential grooves 26, 27 in the shoulders which are connected to the edge grooves 24, 25 by transverse grooves 37. The grooves 26, 27 reinforce the interruption of continuity already created between the tread and the sidewalls of the tyre by the grooves 24 and 25.

The ribs can usefully be provided with very narrow slits or sipes 34, 35, 36 as is usual for increasing road grip.

Where reference is made herein to "transverse" grooves, it will be understood that these grooves do not have to be strictly in planes

at right angles to the equatorial plane.

The zigzag grooves shown in Figure 2 can be replaced by sinuous grooves and the amplitudes of the various grooves can vary from groove to groove as can the widths and lengths of the transverse grooves.

The invention can, of course, be applied also to tyres having a flat tread and pronounced shoulders.

#### WHAT WE CLAIM IS:—

1. A pneumatic tyre of the radial type as hereinbefore defined having a tread provided with a central circumferential groove, two circumferential "side" grooves one on each side of the central groove disposed substantially equidistantly between the central groove and the edges of the tread and transverse grooves extending from opposite sides of the central groove towards but not as far as one of the side grooves.

2. A pneumatic tyre according to Claim 1 in which the transverse grooves on one side of the central groove are staggered relatively to those on the other side.

3. A pneumatic tyre according to Claim 1 or Claim 2 having a circumferential "edge" groove in the vicinity of each edge of the tread and having transverse grooves extending from it towards but not as far as one of the side grooves.

4. A pneumatic tyre according to any preceding claim in which the circumferential grooves zigzag round the tyre.

5. A pneumatic tyre according to Claim 4 in which the transverse grooves proceed from the crests of the zigzags.

6. A pneumatic tyre according to Claim 3 and Claim 4 or Claim 5 in which the transverse grooves which proceed from the central groove are staggered relatively to the transverse grooves which proceed from the edge grooves.

7. A pneumatic tyre substantially as described with reference to the accompanying drawings.

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